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(54) **REAL-TIME, ACTIVE PICOMETER-SCALE ALIGNMENT, STABILIZATION, AND REGISTRATION IN ONE OR MORE DIMENSIONS**

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(57) **ABSTRACT**

A method and apparatus for aligning, stabilizing and registering two or more structures in one or more dimensional space with picometer-scale precision. Low noise laser light is scattered by at least one or more structure or fiducial marks. One mark may be coupled to each structure to be positioned. The light which has been scattered off the fiducial marks is collected in a photo-sensitive device which enables real-time high-bandwidth position sensing of each structure. One or more of the structures should be mounted on a stage, and the stage can move in either one or more dimensions. The photo-sensitive device generates signals in response to the scattered light received, and the signals are used to modulate the position of the stage in a feedback loop.